

**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
STRUCTURE DESIGN UNIT**

**METAL STRAIN POLES FOR
NORTH CAROLINA COUNTIES**

EXAMPLE No. 1

**DESIGNED BY : JAMES BOLDEN
CHECKED BY : FARZIN ASSEFNIA , P.E.**

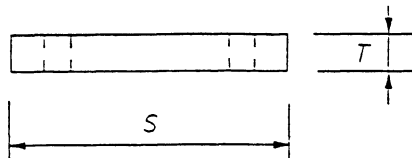
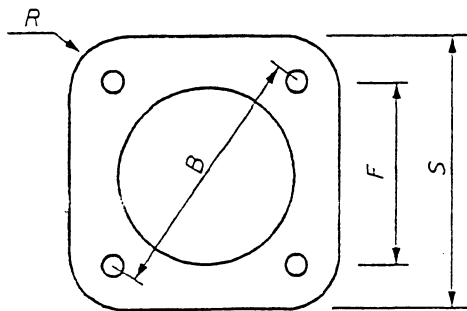
DATE : 11 / 25 / 1996

METAL STRAIN POLES (EX.1)

Wind Velocity (mph)	Steel Pole			Concrete Footing		Anchor Bolts
	Total Height (ft)	Base Diameter (in)	Wall Thickness (gage-in)	Diameter D (in)	Length L (ft)	Diameter x Total Length (in)
70	30	17	0.03125	48	10	2.25 x 48
70	35	18	0.03125	48	10	2.25 x 48
80	30	17	0.03125	48	12	2.25 x 48
80	35	18	0.03125	48	12	2.25 x 48
90	30	17	0.03125	48	12	2.5 x 54
90	35	18	7+7, (0.3586)	48	12	2.5 x 54
100	30	17	7+7, (0.3586)	48	14	2.5 x 54
100	35	17	3+3, (0.5000)	48	14	2.5 x 54

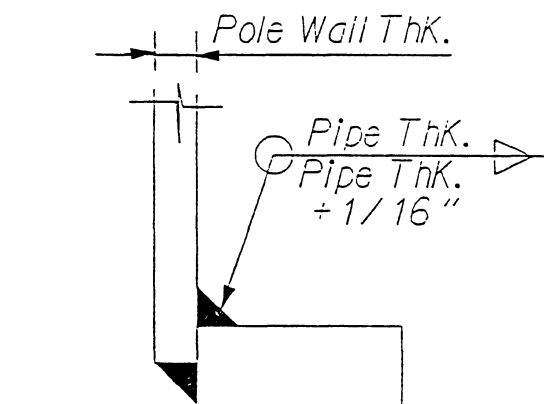
1. POLE MONOTUBE: MINIMUM YIELD STRENGTH OF 66 KSI REQUIRED WITH A LINEAR TAPER-0.14"/FT-GALV. ASTM A123
2. BASE PLATE: ASTM-A36 (YIELD STRENGTH 36 KSI MINIMUM)
3. ANCHOR BOLTS: ASTM-A687 (YIELD STRENGTH 106 KSI MINIMUM) GALV. ASTM-A153 A MINIMUM LENGTH OF 10" ON THE PROJECTION END.
4. ANCH. BOLT NUTS AND WASHERS: SHOULD BE IN ACCORDANCE WITH "NORTH CAROLINA STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES".
5. REINF. STEEL: ASTM-A616 GRADE 60, DEFORMED
6. CONCRETE: CLASS "A" CONCRETE SHALL BE USED FOR FOUNDATION.
7. TIES MAY BE DEFORMED OR PLAIN.
8. POLES AND FOUNDATIONS SHALL MEET THE REQUIREMENTS OF THE NCDOT TRAFFIC SIGNAL SPECIFICATIONS - 1993.
9. FOUNDATION EXCAVATION FOR TRAFFIC SIGNAL STRUCTURE SHALL CONFORM TO THE APPLICABLE PROVISIONS OF SECTION 410 OF THE STANDARD SPECIFICATIONS. THE SIDES OF THE EXCAVATION FOR POLE-TYPE FOOTING SHALL CONFORM AS NEARLY AS PRACTICABLE TO THE REQUIRED DIMENSIONS. CONCRETE FOR POLE-TYPE FOOTING SHALL BE PLACED AGAINST UNDISTURBED SOIL. IF SIGNIFICANT DISCONTINUITIES IN THE REQUIRED CONFIGURATION OF THE EXCAVATION FOR POLE-TYPE FOOTINGS ARE CREATED BY THE REMOVAL OF BOULDERS, OR AS THE RESULT OF OTHER CAUSES, THE EXCAVATION SHALL BE BACKFILLED AND COMPACTED AS PROVIDED FOR IN SECTION 410 OF THE STANDARD SPECIFICATIONS. THE FOUNDATION SHALL BE RE-EXCAVATED TO THE PROPER DIMENSIONS.
10. IF ROCK OR BOULDERS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED TO A DEPTH SUFFICIENT TO OBTAIN THE STABILITY NECESSARY TO SUPPORT THE STRUCTURE FOR THE DESIGN LOADS.
11. IF SHORING IS REQUIRED IN CONJUNCTION WITH EXCAVATION TO KEEP SOIL FROM COLLAPSING, IT SHALL BE 4'-0" DIAMETER, SMOOTH STEEL PIPE RETRACTED AS CONCRETE IS CAST. OPERATION SHALL BE CONDUCTED IN A MANNER THAT ALLOWS NO WATER TO ACCUMULATE IMMEDIATELY BEFORE AND DURING CASTING OPERATION.
12. THE TRAFFIC SIGNAL STRUCTURE SHALL NOT BE ERECTED BEFORE CONCRETE IN THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.

11/4/97



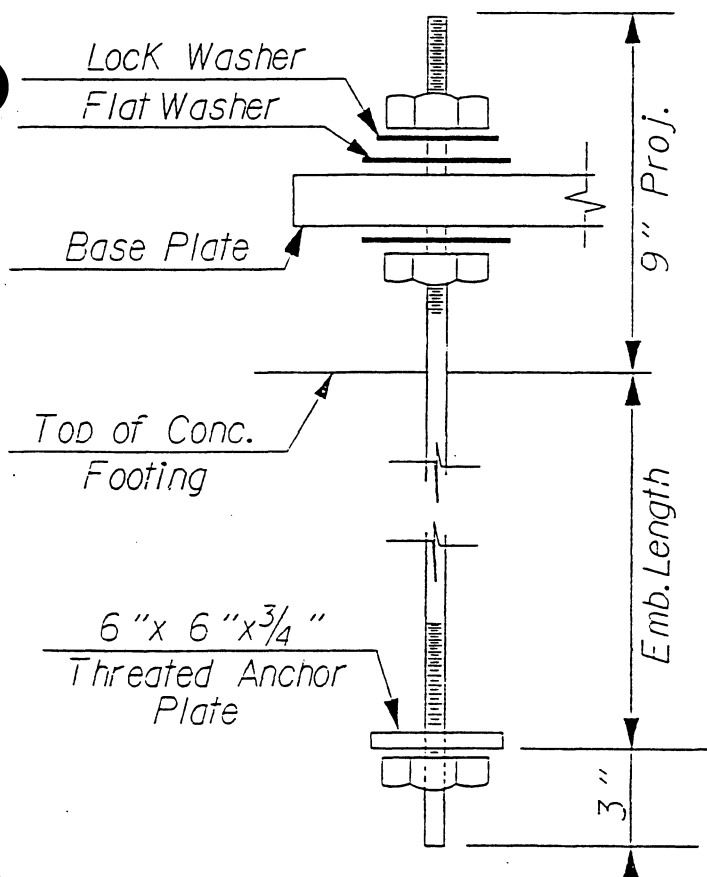
BASE PLATE

Pole Base Diam.,GA (in)	BASE PLATE				
	S (in)	F (in)	T (in)	R (in)	B (in)
17 (0)	24 $\frac{1}{2}$	16 $\frac{5}{8}$	2 $\frac{1}{2}$	5	23 $\frac{1}{2}$
17 (7+7)	24 $\frac{1}{2}$	16 $\frac{5}{8}$	2 $\frac{1}{2}$	5	23 $\frac{1}{2}$
17 (3+3)	24 $\frac{1}{2}$	16 $\frac{5}{8}$	3	5	23 $\frac{1}{2}$
18 (0)	26 $\frac{1}{2}$	18	2 $\frac{1}{2}$	5 $\frac{1}{2}$	25
18 (7+7)	26 $\frac{1}{2}$	18	2 $\frac{1}{2}$	5 $\frac{1}{2}$	25 $\frac{1}{2}$



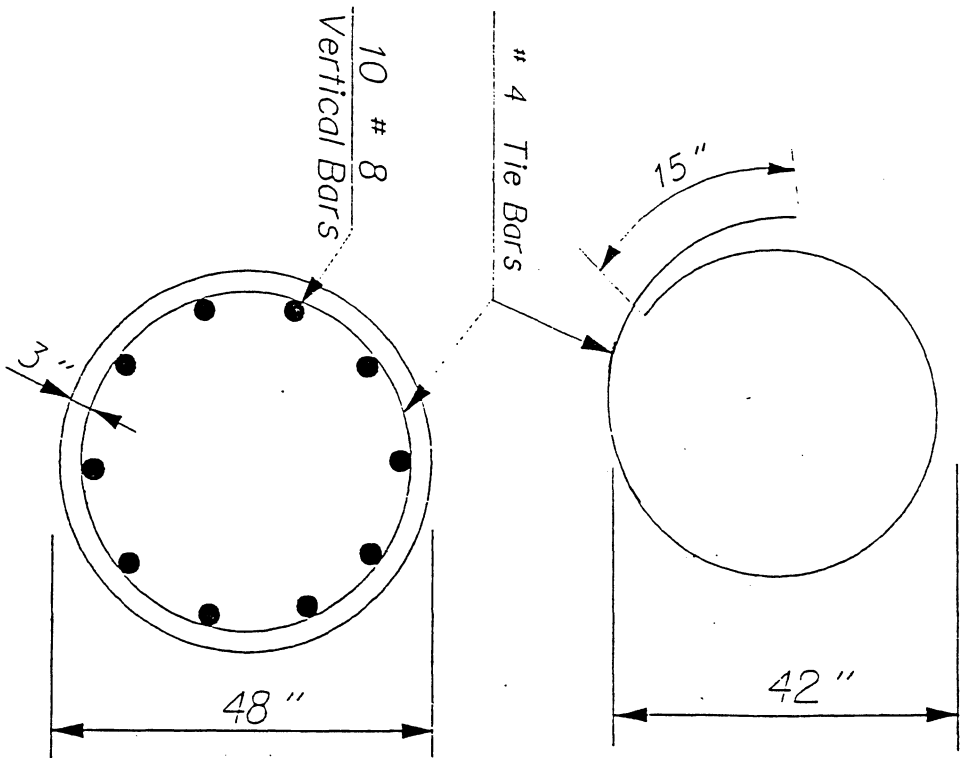
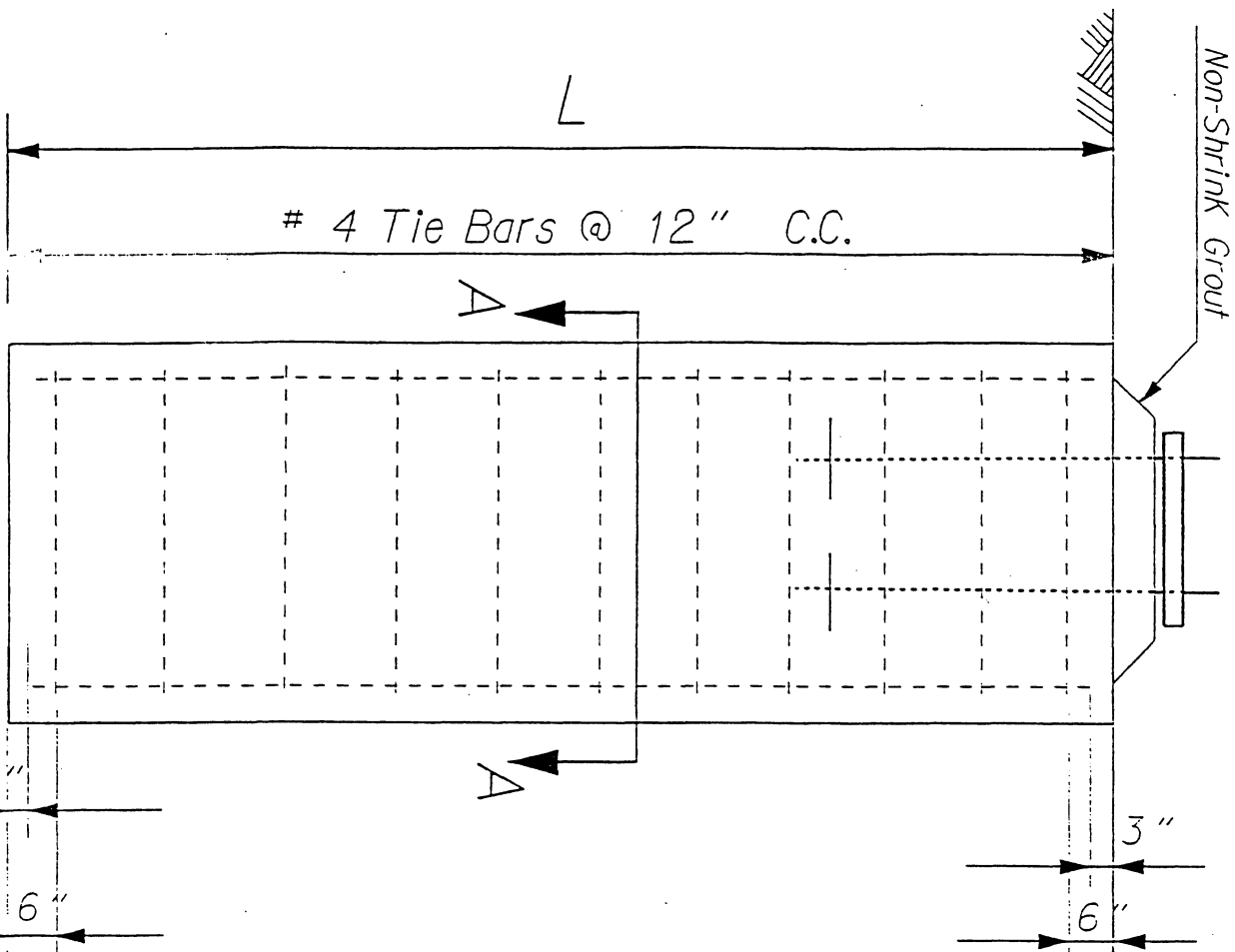
BASE PLATE WELD

TYPICAL



TYP. ANCHOR BOLT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION STRUCTURE DESIGN UNIT		
DESIGN BY W.A.N.	FOOTING PLAN FOR STRAIN POLES	SHEET OF
	CHECK BY F.A.	DATE 11/21/96



SEC. A-A

STATE OF NORTH CAROLINA			
DEPARTMENT OF TRANSPORTATION			
STRUCTURE DESIGN UNIT			
DESIGN BY	FOOTING PLAN FOR	SHEET	
W.A.N.	STRAIN POLES	F	
CHECK BY	DATE		
F.A.	11/21/98		

WIND VELOCITY FOR NORTH CAROLINA COUNTIES

70 mph.

Alamance	Chatham	Harnett	Person	Vance
Alexander	Cleveland	Hoke	Randolph	Wake
Alleghany	Cumberland	Iredell	Richmond	Warren
Anson	Davidson	Lee	Rockingham	Watauga
Ashe	Davie	Lincoln	Rowan	Wilkes
Avery	Durham	McDowell	Rutherford	Yadkin
Burke	Franklin	Mecklenburg	Scotland	Yancey
Cabarrus	Forsyth	Mitchell	Stanly	
Caldwell	Gaston	Montgomery	Stokes	
Caswell	Granville	Moore	Surry	
Catawba	Guilford	Orange	Union	

80 mph.

Bladen	Graham	Hertford	Nash	Swain
Buncombe	Green	Jackson	Northampton	Transylvania
Cherokee	Halifax	Johnston	Polk	Wayne
Clay	Haywood	Macon	Robeson	Wilson
Edgecombe	Henderson	Madison	Sampson	

90 mph.

Bertie	Columbus	Gates	Martin	Perquimans
Chowan	Duplin	Lenoir	Pasquotank	Pitt

100 mph.

Beaufort	Carteret	Dare	New Hanover	Pender
Brunswick	Craven	Hyde	Onslow	Tyrrell
Camden	Currituck	Jones	Pamlico	Washington

**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
STRUCTURE DESIGN UNIT**

**METAL STRAIN POLES FOR
NORTH CAROLINA COUNTIES**

EXAMPLE No. 2

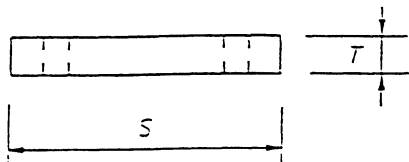
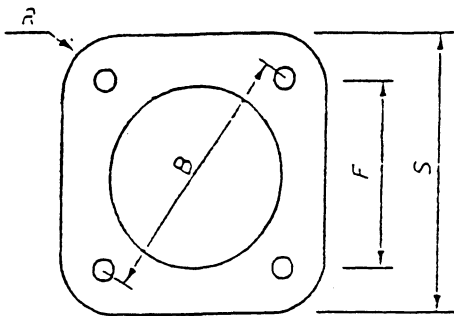
**DESIGNED BY : WAHID NAIM
CHECKED BY : FARZIN ASSEFNI, P.E.**

DATE : 11 / 25 / 1996

METAL STRAIN POLES (EX. 2)

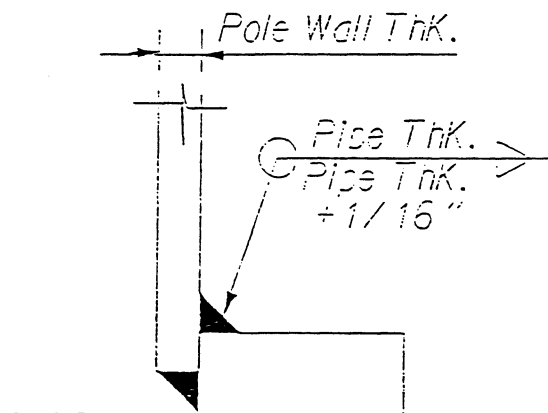
Wind Velocity (mph)	Steel Pole			Concrete Footing		Anchor Bolts
	Total Height (ft)	Base Diameter (in)	Wall Thickness (gage-in)	Diameter D (in)	Length L (ft)	Diameter x Total Length (in)
70	35	15	3, (0.2500)	48	9	2.00 x 48
70	35	17	3, (0.2500)	48	9	2.00 x 48
80	30	16	3, (0.2500)	48	10	2.00 x 48
80	35	17	3, (0.2500)	48	10	2.00 x 48
90	30	17	3, (0.2500)	48	12	2.25 x 48
90	35	18	0, (0.3125)	48	12	2.25 x 48
100	30	18	0, (0.3125)	48	12	2.25 x 48
100	35	18	0, (0.3125)	48	12	2.25 x 48

1. POLE MONOTUBE: MINIMUM YIELD STRENGTH OF 55 KSI REQUIRED WITH A LINEAR TAPER-0.14"/FT-GALV. ASTM A123
2. BASE PLATE: ASTM-A36 (YIELD STRENGTH 36 KSI MINIMUM)
3. ANCHOR BOLTS: ASTM-A687 (YIELD STRENGTH 105 KSI MINIMUM) GALV. ASTM-A163 A MINIMUM LENGTH OF 10" ON THE PROJECTION END.
4. ANCH. BOLT NUTS AND WASHERS: SHOULD BE IN ACCORDANCE WITH "NORTH CAROLINA STANDARD SPECIFICATIONS FOR ROADS AND STRUCTURES".
5. REINF. STEEL: ASTM-A616 GRADE 60, DEFORMED.
6. CONCRETE: CLASS "A" CONCRETE SHALL BE USED FOR FOUNDATION.
7. TIES MAY BE DEFORMED OR PLAIN.
8. POLES AND FOUNDATIONS SHALL MEET THE REQUIREMENTS OF THE NCDOT TRAFFIC SIGNAL SPECIFICATIONS - 1993.
9. FOUNDATION EXCAVATION FOR TRAFFIC SIGNAL STRUCTURE SHALL CONFORM TO THE APPLICABLE PROVISIONS OF SECTION 410 OF THE STANDARD SPECIFICATIONS. THE SIDES OF THE EXCAVATION FOR POLE-TYPE FOOTING SHALL CONFORM AS NEARLY AS PRACTICABLE TO THE REQUIRED DIMENSIONS. CONCRETE FOR POLE-TYPE FOOTING SHALL BE PLACED AGAINST UNDISTURBED SOIL. IF SIGNIFICANT DISCONTINUITIES IN THE REQUIRED CONFIGURATION OF THE EXCAVATION FOR POLE-TYPE FOOTINGS ARE CREATED BY THE REMOVAL OF BOULDERS, OR AS THE RESULT OF OTHER CAUSES, THE EXCAVATION SHALL BE BACKFILLED AND COMPACTED AS PROVIDED FOR IN SECTION 410 OF THE STANDARD SPECIFICATIONS. THE FOUNDATION SHALL BE RE-EXCAVATED TO THE PROPER DIMENSIONS.
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12. THE TRAFFIC SIGNAL STRUCTURE SHALL NOT BE ERECTED BEFORE CONCRETE IN THE FOUNDATION HAS ATTAINED A MINIMUM COMPRESSIVE STRENGTH OF 3000 PSI.



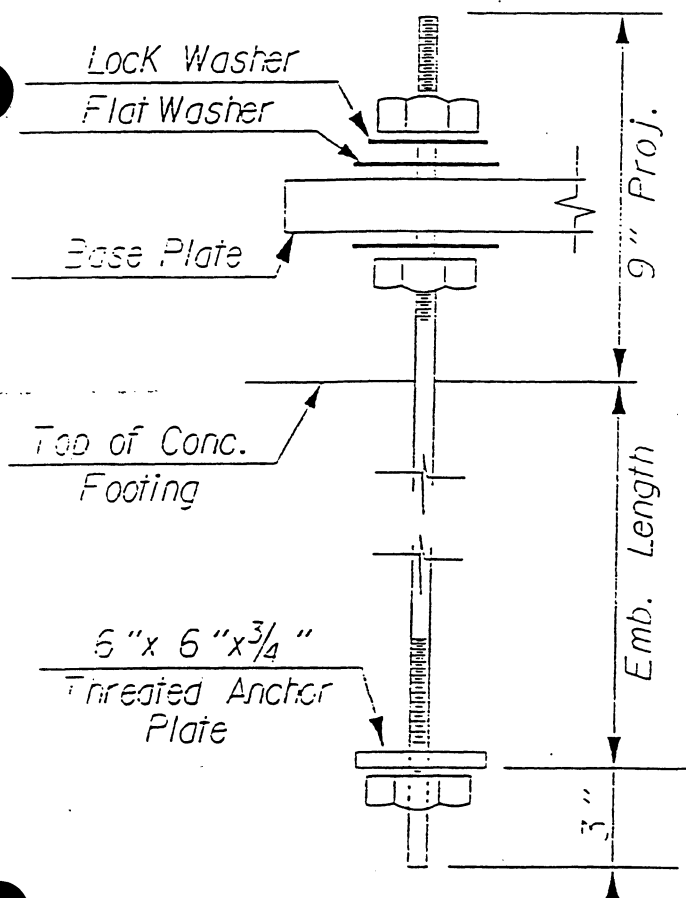
BASE PLATE

Pole Base Diam., GA (in)	BASE PLATE				
	S (in)	F (in)	T (in)	R (in)	B (in)
15 (3)	23	15 1/2	2	4 5/8	22
16 (3)	24 1/2	16 5/8	2	5	23 1/2
17 (3)	26 1/2	18	2	5 1/2	25 1/2
18 (0)	26 1/2	18	2 1/2	5 1/2	25 1/2



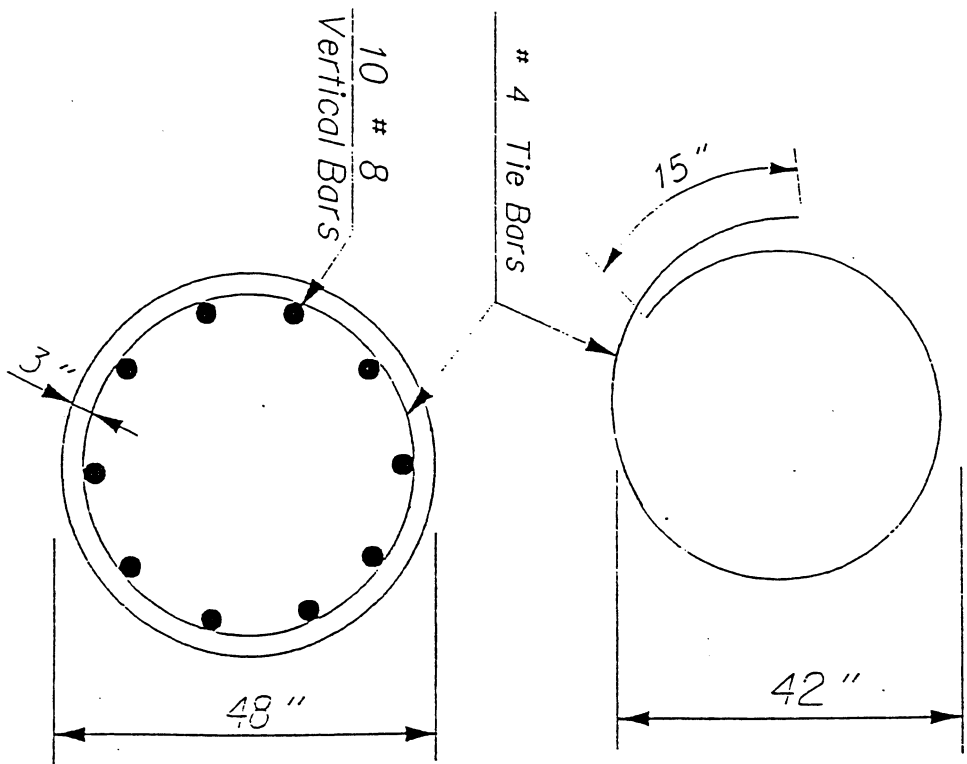
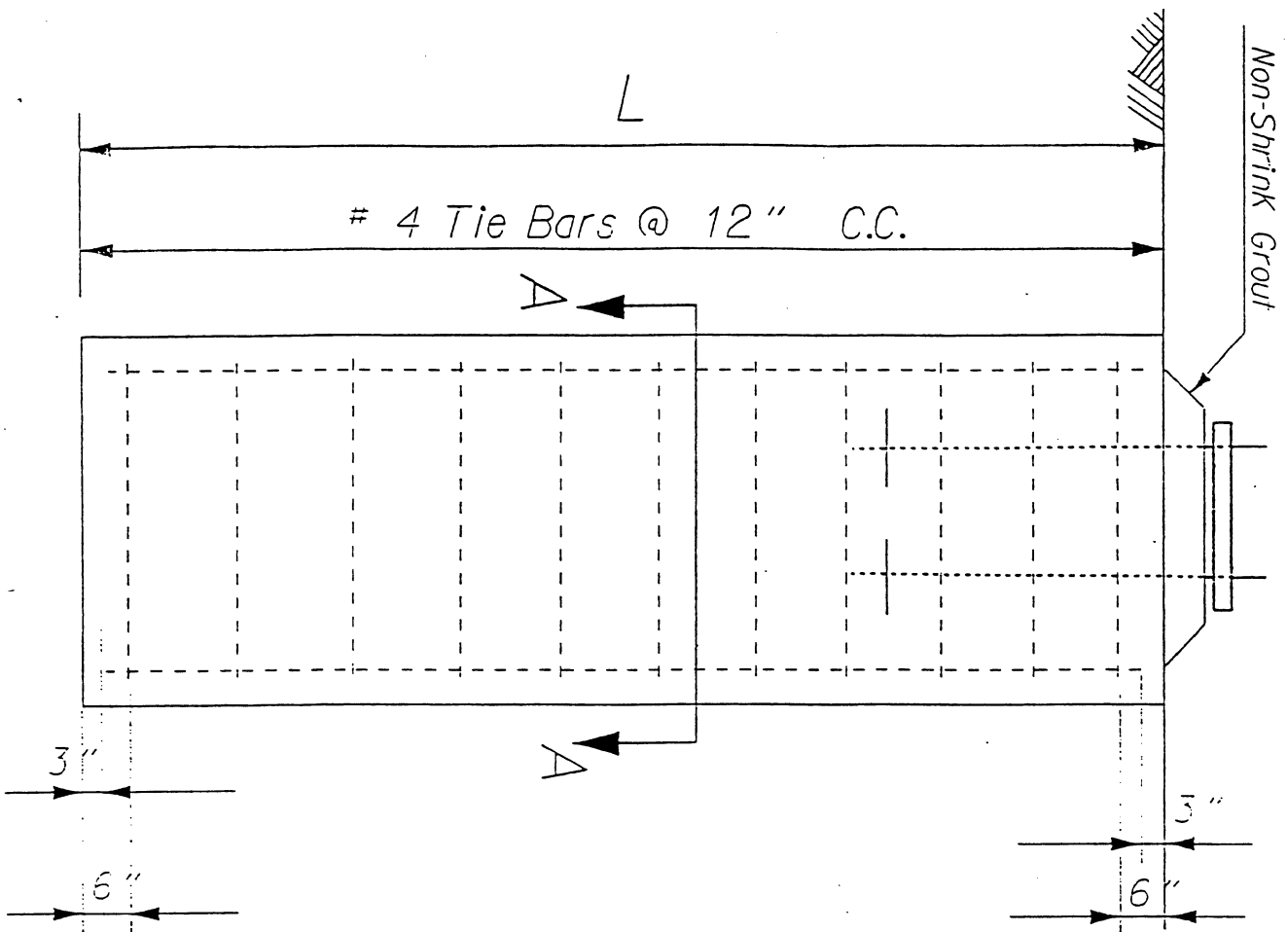
BASE PLATE WELD

TYPICAL



TYP. ANCHOR BOLT

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION STRUCTURE DESIGN UNIT		
DESIGN BY	FOOTING PLAN FOR STEEL POLES	SHEET OF
W. A. W.	CHECKED DATE 11/21/95	



SEC. A-A

STATE OF NORTH CAROLINA			
DEPARTMENT OF TRANSPORTATION			
STRUCTURE DESIGN UNIT			
DESIGN	FOOTING PLAN FOR	SHEET	
By	STRAIN POLES		
W.A.W.	CHECK BY	DATE	
	F.A.	11/21/90	

WIND VELOCITY FOR NORTH CAROLINA COUNTIES

70 mph.

Alamance	Chatham	Harnett	Person	Vance
Alexander	Cleveland	Hoke	Randolph	Wake
Alleghany	Cumberland	Iredell	Richmond	Warren
Anson	Davidson	Lee	Rockingham	Watauga
Ashe	Davie	Lincoln	Rowan	Wilkes
Avery	Durham	McDowell	Rutherford	Yadkin
Burke	Franklin	Mecklenburg	Scotland	Yancey
Cabarrus	Forsyth	Mitchell	Stanly	
Caldwell	Gaston	Montgomery	Stokes	
Caswell	Granville	Moore	Surry	
Catawba	Guilford	Orange	Union	

80 mph.

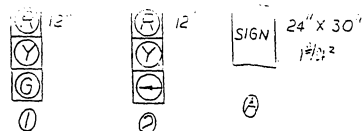
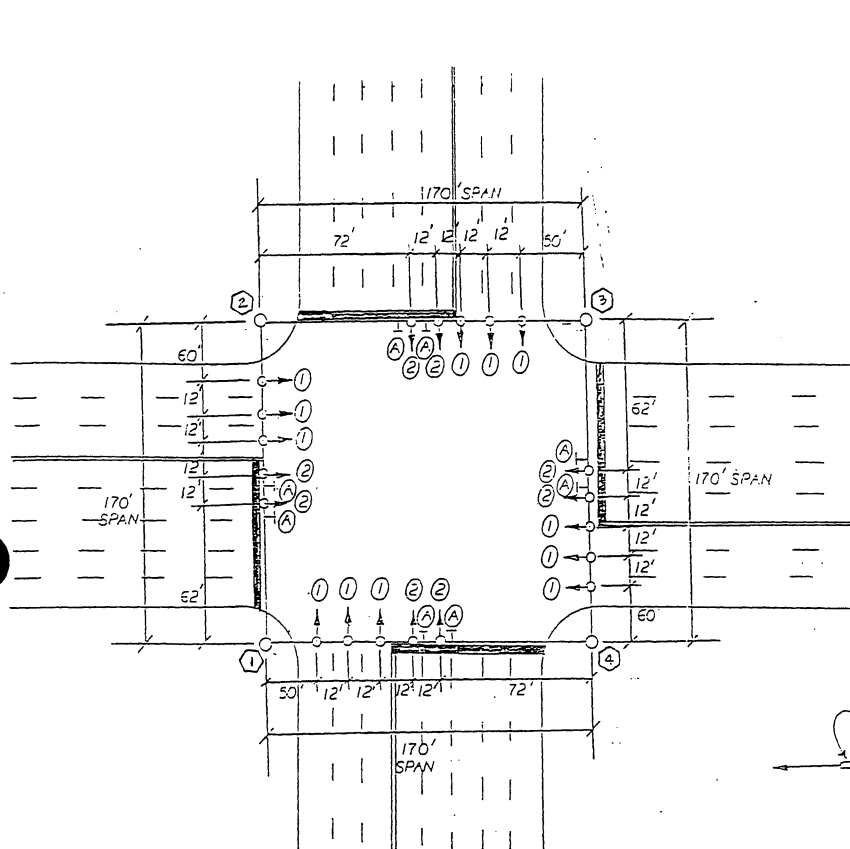
Bladen	Graham	Hertford	Nash	Swain
Buncombe	Green	Jackson	Northampton	Transylvania
Cherokee	Halifax	Johnston	Polk	Wayne
Clay	Haywood	Macon	Robeson	Wilson
Edgecombe	Henderson	Madison	Sampson	

90 mph.

Bertie	Columbus	Gates	Martin	Perquimans
Chowan	Duplin	Lenoir	Pasquotank	Pitt

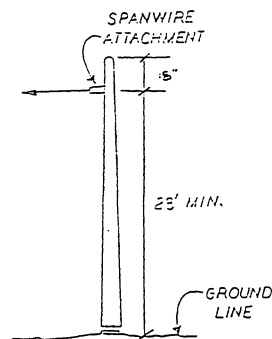
100 mph.

Beaufort	Carteret	Dare	New Hanover	Pender
Brunswick	Craven	Hyde	Onslow	Tyrrell
Camden	Currituck	Jones	Pamlico	Washington

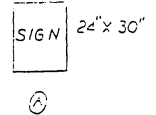
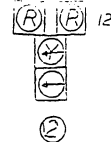
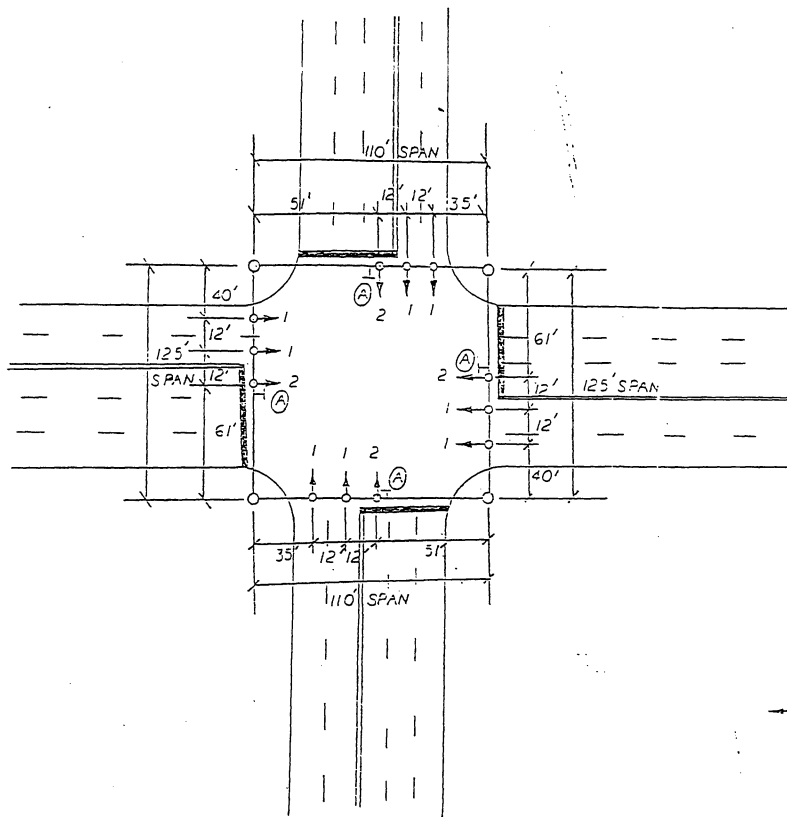


RESTRICTIONS

1. GALVANIZED ONLY
2. BACKPLATES ON ALL HEADS
- ~~3. FOOTING 5' 6" X 18' 6" (MAX)~~
4. DESIGN FOR: ALL 30' POLES
ALL 35' POLES

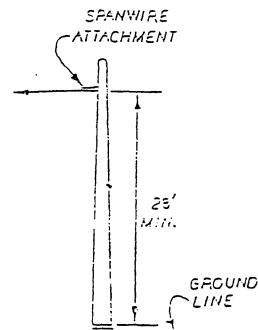


EXAMPLE NO. 1
DESIGN FOR
METAL STRAIN POLE
Drawing No. MS.P.1



RESTRICTIONS

- 1- GALVANIZED ONLY
- 2- BACKPLATES ON ALL HEADS
- ~~3- MAXIMUM FOOTING SIZE 3'0" x 6'0"~~
- 4- DESIGN: ALL 30' POLES AND ALL 35' POLES



EXAMPLE NO. 2
DESIGN FOR
 METAL STRAIN POLE
 Drawing no. MSP-2